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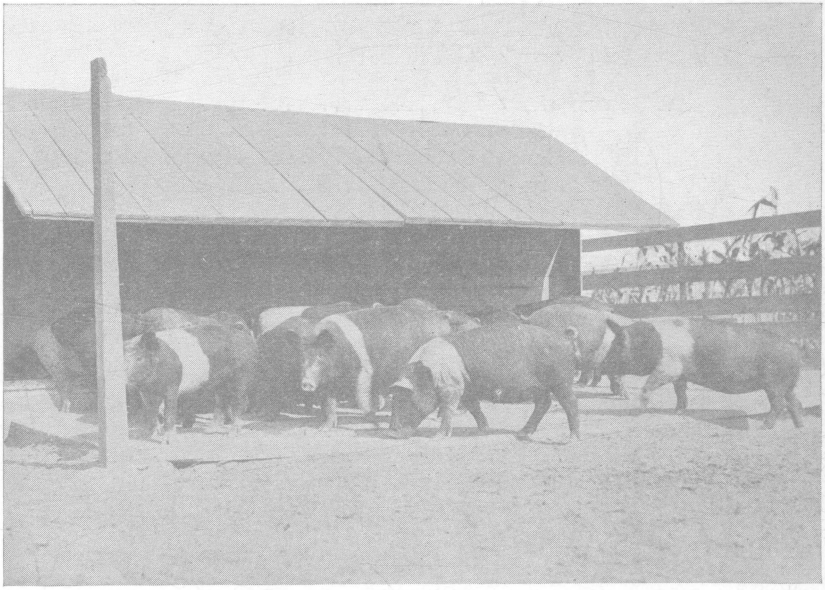
SWINE FEEDING



A good type of self-feeder. This feeder is being used for a breeding herd

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SWINE FEEDING

JOHN W. WUICHET

A discussion of swine feeding would not be complete without some attention being given to the type of hogs to select for the feeding operation.

During the past decade, there has been a very marked transition in type, due partly to changed market demand but more particularly to an effort to produce the most economical feeding hog. It is generally recognized that the present-day large-type hog, as represented by the best of all the popular breeds, is a more economical user of feed, is more prolific, and has greater foraging ability than the old-fashioned, short, compact type. There has been some criticism that there is a marked tendency to go to extremes in the development of the hog of today, but, while there is no desire to enter into a lengthy discussion of that point, it seems that the average of the feeder hogs of today are so far from being of the extreme type that it should cause little worry.

A hog may be closely compared to a machine or engine built for the production of pork. Like any other machine, its efficiency depends primarily upon two factors, namely, its construction and the power or fuel applied to produce the energy. Since the most economical feeding type is rather generally recognized, most of the following discussion will be confined to feeding suggestions.

Before entering directly into a discussion of feeds and feeding methods, it is well to understand some of the essential requirements of the animal so that feeding methods may be more intelligently applied. A chemical analysis of the carcass of a hog will show some of the essential requirements.

COMPOSITION OF THE HOG

A hog is made up of water, ash or mineral matter, protein, carbohydrates, and fats.

Water.—About one-half of the body of the average hog is composed of water; the fatter or more mature the hog becomes, the smaller is the percentage of water. In addition to actually composing a large part of the body, water also performs a number of other very important functions, namely, it serves as a carrier of food from the digestive tract to the body cells; it removes the waste tissue and poisons in the body thru the urine; and it helps to equal-

ize the body temperature. Thus is seen the extreme importance of the water supply. In fact, a hog may die sooner thru lack of water than from lack of feed.

Ash.—The ash, or mineral matter, constitutes about 2½ percent of the total and is found principally in the skeleton or bony framework of the hog. Small quantities of ash may be found in other parts of the body. The ash consists largely of lime and phosphorus but contains small amounts of various other elements. The importance of mineral matter is becoming more marked since the development of the bigger-framed hog of today, and many of the common hog feeds are deficient in this particular.

Protein.—Protein is found mostly in the muscles, blood, nerve fibers, hide, and vital organs and constitute an average of somewhat more than 12 percent of the body. The fatter the hog, the smaller is the percentage of protein.

Carbohydrates.—The carbohydrates of the body exist principally in the blood and the liver, with a trace in the muscles. The liver withdraws these substances from the blood and stores it, from which it is gradually supplied back to the blood as needed.

Fats.—The fats form about one-third of the total weight of the hog and are distributed generally thruout the body. Their principal function is to supply heat and energy to the hog.

COMPOSITION OF FEEDS

An analysis of the common feeding stuffs will show a marked similarity between the composition of the animal body and the composition of the feeds. However, there are some essential differences in the types of these substances but which are hardly worth discussion in a bulletin of this type.

Water.—All feeds contain some water, the amount varying considerably with the type of feed but in no case is there a sufficient quantity in any of the feeds to supply the amount necessary for the proper functioning of the body, thus the necessity for supplying water in rather liberal quantities. Generally speaking, water supplied as such is just as good as water combined in some form with the feeds. However, it may be advisable under certain conditions to combine water with feeds or perhaps to heat it, particularly in cold weather in order to get the hogs to drink a sufficient amount. To supply the required amount is the essential factor rather than the form in which it is given.

Ash.—Most of the grains used in hog feeding contain a relatively small amount of ash, or mineral matter, as also do the grain by-products. Forages, particularly alfalfa and clover, contain large amounts of ash, as also does tankage. The large amount of ash in these feeds makes them doubly valuable as a feed for hogs. To make up the deficiency of ash in most of the feeds, these very necessary substances may be supplied in the inorganic form. This will be discussed more fully under mineral feeds.

Protein. — All common feeds contain protein in varying amounts. Such feeds as corn, oats, wheat, and barley are low in the amount of protein they carry. Middlings, bran, oil meal, and soybean meal contain relatively large amounts, while skimmilk, tankage, fish meal, meat meal, and similar feeds carry the largest amount. The protein of feeds supplies the material for the protein of the hog body and if fed in excess, it may also go to build up fat and to produce some of the heat and energy for the body. While it is always necessary to supply a sufficient amount of protein, it is not advisable to feed it in excess, because feeds high in protein are always high in price, and the fat, heat, and energy producing needs of the hog can be more cheaply met with other feeds.

Carbohydrates.—The carbohydrates are found most abundantly in corn, barley, rye, and wheat. They are composed of the same chemical elements as the fat of the animal body and furnish the principal source of the fat supply. They also furnish the material for the production of heat and energy.

Fats.—The fats are made of the same chemical materials as the carbohydrates but have practically two and one-fourth times the energy value. Their function is essentially the same as the carbohydrates.

WHAT IS A BALANCED RATION?

It is impossible to lay down any definite rules for hog feeding under all conditions, but there are some main points which should be given consideration.

Generally, when speaking of a balanced ration, consideration is given only to the relationship between the protein in a feed and the carbohydrates and fats; the last two being grouped together because of their similarity of composition. If the proper amounts of these two groups exist in a ration, to meet the requirements of the hog for maintenance and growth without excess or waste, it is said to be balanced. The requirements for maintenance and growth vary with the age and weight of the animal and in the case

of the brood-sow, the requirements vary with her condition as well as her age and weight. Thus there can be no balanced ration for hogs under all conditions. Further, there are practically no single feeds which may be considered balanced feeds under any conditions, so, in order to get best results it is always necessary to feed two or more feeds to bring about the proper balance. In case only two feeds are used to make up the ration, one should be high in protein and the other high in carbohydrates and a similar relationship should be maintained where more than two feeds are used.

RATIONS FOR DRY-LOT FEEDING

I. **Suckling Pigs,** 5 to 40 pounds (fed in creep)
   1. Corn 80 pounds, tankage 20 pounds.
   2. Corn 75 pounds, middlings 10 pounds, tankage 15 pounds.
   3. Corn 30 pounds, ground barley 30 pounds, ground oats (screened) 25 pounds, tankage 15 pounds.

II. **Weanling Pigs,** 30 to 100 pounds
   1. Corn 80 to 85 pounds, tankage 15 to 20 pounds.
   2. Corn 75 to 80 pounds, middlings 10 pounds, tankage 10 to 15 pounds.
   3. Corn 50 pounds, ground barley 35 pounds, tankage 15 pounds.

III. **Shotes,** 100 to 175 pounds
   1. Corn 85 to 90 pounds, tankage 10 to 15 pounds.
   2. Corn 75 to 80 pounds, middlings 10 to 15 pounds, tankage 10 pounds.
   3. Corn 50 pounds, ground barley 40 pounds, tankage 10 pounds.

IV. **Hogs,** 175 to 250 pounds
   1. Corn 92 to 96 pounds, tankage 4 to 8 pounds.
   2. Corn 60 pounds, ground barley 35 pounds, tankage 5 pounds.

These rations may be hand-fed or self-fed, and they may be mixed in the proportions given. However, if used in the self-feeder, it probably would be preferable to have the ingredients in separate compartments. If the materials are to be mixed together before feeding, the corn should be ground.

Salt should be fed as a part of all rations. Best results are usually obtained when it is self-fed, but the hogs should be accustomed to the salt before being allowed free access to it.

In the above rations, oats may be substituted for part or all of the barley and by adding 10 percent to the amounts, oats may be substituted for part of the corn but should not exceed more than 40 percent of the total feed given. Fish meal may be substituted for the tankage. Skimmilk may also be substituted for the tankage in whole or in part. Where skimmilk is fed, it should be used in approximately the proportions of 1 gallon to each 2½ or 2¾ pounds of grain fed, or at the rate of 3 pounds of milk to 1 pound of grain.

THE SELF-FEEDER

A great deal has been said and written about the use of the self-feeder, but when all of the facts are considered, the situation can generally be summed up with the statement that **intelligent** hand-feeding will produce as good results as the self-feeder. However, considerable depends upon the intelligence of the feeder, and, unless he is a close student of his hogs, the self-feeding will probably prove the more profitable method.

One advantage of the self-feeder is that it will probably save some labor, but the amount of labor saved depends somewhat on the size and type of the feeder. A small feeder requires frequent filling, and practically all feeders require considerable attention to see that the feed is feeding down properly. Frequent attention should be given to see that feed is not being nosed out and wasted and that, if the feeds are in separate compartments, the hogs are not eating too much of the protein feeds and not enough of the others, or vice versa.

The hog is not infallible in his selection of the feeds he needs. He is inclined, when on a self-feeder, to eat more than the required amount of those feeds which are the most palatable and less than he needs of those with less palatability. It is well, therefore, to have all of the feeds in the self-feeder of as near equal palatability as possible in order to get best results.

The Iowa Experiment Station reports excellent results from the use of the self-feeder, not only for producing market hogs, but also for raising breeding gilts and for feeding nursing sows with their litters. In regard to raising breeding gilts on a self-feeder the suggestion is made that, in order to keep them from getting too fat, such bulky feeds as ground alfalfa, ground clover, ground oats, bran, or similar feeds be mixed with the concentrated feeds such as ground corn, barley, wheat, rye, tankage, and so on. Ground alfalfa seems to give the best results as it apparently stimulated growth. In order to regulate the degree of fatness on the gilts,

simply increase or decrease the amount of the bulky feeds according to the tendencies of the gilts.

For nursing sows, it is advisable not to have them on the self-feeder for the first 10 days or 2 weeks after farrowing; but after that, if a well-balanced ration is fed, they will do well. The combination that gave the best results was corn, middlings, and tankage or meat meal; in addition, the hogs were allowed limestone, charcoal, and salt. No trouble was noted from scours and in some instances the sows actually gained in weight during the nursing period.

It seems very possible, from results obtained at various experiment stations, to use the self-feeder to considerable advantage in nearly all departments of swine feeding, if it is properly handled and the right sorts of feeds are provided.

FORAGE CROPS

Growing and fattening hogs in the summer time without the use of some good forage crop is usually an uneconomical practice, as a saving of from 20 to 40 percent in the total amount of grain and supplements may be expected thru the use of forage. Pasture crops when combined with grain feeds and tankage will produce the cheapest rations for both breeding and fattening hogs, and the cost of gains will range from one-fifth to one-third cheaper than when grain is fed in a dry lot.

The results of a large number of feeding trials under various conditions show that it requires about an average of 5 pounds of grain to produce a pound on pigs fed in a dry lot, while similar feeding on some good forage has reduced the amount of grain, to produce a pound of gain, to 3.2 pounds. This would show a saving of better than 35 percent of the grain when fed on some good forage.

It may be possible in some cases with an abundance of good forage, to obtain fairly satisfactory gains for a time on such forage alone, but the greatest returns have been obtained when grain was fed in addition to the forage at the rate of 1½ to 3 percent of the weight of the hogs per day. The grain mixture to be used may be similar to those recommended for dry-lot feeding, except that the tankage may be reduced one-half or left out completely, depending upon the quality of the forage used. The number of hogs that may be supported on an acre of forage will depend, in the first place, on the size of the hogs and the abundance of the forage; but it will also depend on the amount of grain fed in addition, as the heavier

the grain feeding, the more hogs can be supported on an acre of forage.

Since no single pasture crop fulfills the forage requirements for the entire season, it is advisable to provide several kinds of forage crops, if possible, in order to provide the maximum of pasturage thru the whole season. Change of pasture is good for the hogs and the pasture as well, for it gives the pasture a rest and adds variety to the ration for the hogs, both of which are good practices provided that the forages are of about equal palatability.

Good forage saves from 20 to 40 percent of grain and supplements

There are several requirements of good forage crops. They should provide abundant growth for a short time or continuous growth for a fairly long season, and they must be palatable. A combination of all three essentials adds to the value of the forage. The palatability will be increased by turning in the hogs when the crop is young and tender and by keeping it pastured down fairly well. Care should be taken, however, that it is not pastured so closely that new growth is injured.

The following are some suggestions regarding best forage crops:

Alfalfa.—Alfalfa pasture will produce more pork per acre on the average than any other forage crop. It is one of the earliest pasture crops to be available in the spring and if kept clipped when necessary during the summer, it will provide good forage until late in the fall. Under average conditions an acre of alfalfa will pasture from 10 to 20 shotes, depending on the conditions previously mentioned. It should not be pastured too closely as it does not stand very heavy foraging. It probably would be best to pasture it in such a way as to permit the cutting of two small crops of hay during the season in addition to the pasture furnished. Alfalfa is a crop that is high in protein and mineral matter, both of which are very necessary in animal growth and which are decidedly lacking in corn, the feed that forms the basis for practically all hog rations. For this reason alfalfa is doubly valuable as a forage crop.

Red Clover.—Red clover makes an excellent pasture for hogs and ranks close to alfalfa as a forage. From the standpoint of the average farmer or hog feeder, it will probably be the most used forage crop particularly because it fits better into almost any system of crop rotation than does alfalfa. However, it will not usually support quite so many head per acre, nor will the forage season be quite so long, but if not pastured too closely and not allowed to go to seed, it will generally produce an abundance of good forage all summer. An acre of clover should furnish ample pasture for from 8 to 16 shotes if properly handled. Clover is high in protein and will replace a large part of the tankage or similar feeds, necessary to get maximum growth.

Rape.—Rape is also one of the valuable crops for pork production. Altho it is not a legume, rape compares favorably in composition with alfalfa and clover and is particularly valuable as a forage to help out these two crops during July and August when they are likely to make short growth. Rape ranks close to alfalfa in the number of hogs it will pasture per acre. With a favorable season it will support from 10 to 20 shotes.

Rape may be sown any time after the danger of hard freezing is past and, if sown early, it should provide pasturage by the middle of May or a little later. It is advisable to sow rape several times during the season so that continuous forage will be provided. The Dwarf Essex rape is the variety which should be used and broadcasted at the rate of from 5 to 8 pounds per acre on a well prepared

seedbed. An old feed lot is an ideal place in which to sow rape. The great value of this crop lies in the fact that it can be sown almost any time during the growing season and will make abundant growth quickly. It will renew itself readily if not pastured too closely and the hogs are removed for two or three weeks.

While rape is usually quite palatable, complaint is sometimes made that it is difficult to get hogs to eat it. However, if they are given access to no other green feed, they will usually learn to like it before receiving any serious setback. Pasturing hogs on rape will sometimes cause scabs and sores, particularly on light-skinned hogs, or on the thin parts of the skin. If this occurs, remove the hogs from the rape for a time and apply sulfur and lard to the sores.

Rape and Oats.—Rape and oats are sometimes sown together and some feeding results give this combination as preferable to rape alone. However, results at the Ohio Experiment Station seem to indicate that mixtures are less valuable as forage than rape alone.

Soybeans.—The best results from the use of soybeans may be expected when they are planted in connection with corn where both crops are to be hogged down. Even when this combination is used, experimental results indicate that it will pay well to add some tankage to the ration, either self-fed or, at least, in amount of one-half that which would be given were soybeans not present. Soybeans do not make an ideal forage crop because they do not produce new growth when eaten off and consequently their season is short. To be used as a forage, the hogs should be turned in when the pods are just well formed, and, for hogging down, a variety of beans should be used that will mature with the corn, and the hogs turned in when the corn is ready.

Sweet Clover.—Since sweet clover has come into prominence as a soil builder and of high yielding capacity, it has been advocated as a possible forage for hogs. During the first year, if sown alone without a nurse crop, it will supply forage from early summer until late in the fall, but, during the second year, it becomes entirely too woody to be of much value as a pasture crop for hogs. It also, as a rule, does not prove readily palatable and some time may elapse before the pigs become accustomed to it.

Rye.—Rye when sown early in the fall will furnish later green forage than almost any other crop, and will also furnish good pasture quite early in the spring. However, its value as a pasture crop is quite limited, because it soon becomes woody in the late spring, which renders it unpalatable and indigestible. Hogging off rye

after it has become ripe has proven a fairly successful practice. If this plan is followed, the rye should be allowed to be thoroly ripe and the heads crinkled down. The grain does not shatter easily, which makes it an ideal crop for hogging down. About the same returns may be expected from rye harvested in this way as when harvested for the grain.

Bluegrass.—Probably bluegrass is used more extensively as a pasture for hogs than any other grass crop, and during the spring before jointing or heading out and late in the fall it makes a fairly good pasture. During the summer it becomes dry, woody, and unpalatable, which renders it of very little value as a feed for hogs. If bluegrass is to be used, it should be supplemented during the summer months with alfalfa, clover, or rape.

PLAN FOR A FORAGE CROP ROTATION

A plan of handling hogs on forage which has proved quite successful in some sections is as follows:

A plot of ground, the size of which will depend upon the number of hogs to be fed, is selected for the feeding operation. This lot is first divided equally and then one half is again divided equally. If the plan is started in the fall, one of the small sections is sown to rye, which will furnish some late fall pasture if needed and will furnish the earliest pasture in the spring.

As soon as possible in the spring the second small plot is sown to oats and rape, or some similar crop, and when ready, the hogs are turned from the rye to the oats and rape. The next step is to plow the rye plot and sow rape, or some other good forage crop, and change the hogs to it when it has attained a good growth.

At the proper time the larger lot should be planted to corn and soybeans, to be hogged off when ready.

By this method good forage is obtained all season and the hog-feeding operations are handled with the minimum of effort. Where careful, accurate records have been kept on this method of feeding, including all costs for labor, fencing, etc., the plan has proved highly successful and profitable.

HOGGING DOWN

Hogging down corn is a practical and economical way of harvesting part of the corn crop and feeding hogs at the same time. The opinion sometimes expressed that hogging down corn is a

wasteful practice is not borne out by feeding tests. Rapid and economical gains are usually made by the hogs, and satisfactory returns have been made for the corn so harvested. Hogs before being turned into a field to be hogged down should be accustomed to the green corn, being first fed gradually until they are on full feed. The corn should be practically ready to cut to put in the shock before the hogs are turned in.

Number of Hogs to the Acre.—The number of hogs that an acre of corn will feed depends upon the size of the hogs and the yield of the corn, but generally speaking it will take twenty 100-pound hogs about 30 days to consume an acre of corn yielding 60 bushels of corn to the acre. Other weights of hogs and yields of corn may be figured using the above as a basis. Where a large acreage is to be hogged off or a small number of hogs is to be fed, the use of a temporary fence, set and moved so as to require the hogs to clean up the corn fairly well as they go, will be found to be an advantage.

Some protein supplement such as tankage should be provided and is probably best used by placing it in a self-feeder. Better than 30 percent greater gains per acre have been obtained where tankage was fed at the rate of about 1/5 pound per day per hundredweight of hogs. It is also important that plenty of clear water be supplied and salt should be kept before the hogs at all times.

Soybeans in Corn Adds Protein.—The practice of planting soybeans with the corn to be hogged off has met with considerable favor. The beans help to supply some of the needed protein and while it is probably advisable to feed some tankage in addition, yet the beans will generally result in the saving of enough tankage to make it a profitable crop.

When corn alone is to be hogged off, or with soybeans added, early maturing varieties are to be preferred in order to get the hogs onto market ahead of the usual "break" in the market about the last week in September. The *Manchu* and *Ito San* are the best varieties of beans for hogging down.

Preferably the beans should be drilled with the corn by using a bean attachment on the planter. Where no such attachment is available, put the corn and beans in the planter together with about ¾ bushel of beans to a bushel of corn. Mix thoroly and stir about every 30 rods in drilling to keep the beans from settling to the bottom. Set planter to plant somewhat closer than when corn is drilled alone.

Pull some of the beans and get the pigs accustomed to them before turning in on the field, otherwise the pigs may not eat the beans readily at the start.

Advantages and Disadvantages of Hogging Off.—The advantages of hogging off such as (1) rapid and economical gains, (2) saving of labor and expense in harvesting and marketing, (3) crib space saved, and (4) a minimum of fertility removed from the soil, are only partly offset by some of the disadvantages. Some of these are as follows: (1) possible harmful effect on the soil if weather conditions are unfavorable, (2) a waste of some corn in wet weather, (3) the loss of the stalks (fodder) for feeding purposes, and (4) the partial necessity of marketing the hogs at the time of year when they are usually comparatively low in price.

MINERAL FEEDS

The development of the present-day type of hog has apparently brought about an increased need for minerals in the ration. This is due to the fact that the hog of today carries a larger bone and more skeleton framework than formerly, and the greater amount of minerals found in the animal body is in the bones.

Corn, which forms the basis of practically all hog rations, is especially deficient in mineral, as are most of the grain feeds or grain by-products that are commonly fed to hogs, and this necessitates meeting the mineral requirement of the hog with some substances which are largely mineral in their make-up. In a report from the Ohio Experiment Station on testing the value of mineral feeds for hogs, the following statement is made: "A group of hogs receiving corn and linseed meal gained only 82.5 percent as much and consumed 16.4 percent more feed per unit of gain than other similarly fed groups except that the other groups had access to ground limestone and ground rock phosphate kept before them in separate containers."

Minerals are particularly valuable for hogs when there is no green feed available, and when the hogs are being fattened on corn with vegetable proteins being used to supplement the corn. Minerals are not quite so essential where the hogs are on some good forage or when the corn is being supplemented with tankage, fish meal, or dairy by-products. However, from practically all available evidence, it has been found beneficial to feed some minerals no matter what other feeds are used, and the addition of the minerals has resulted in a saving of feed, particularly of the high-priced protein feeds.

In addition to the mineral combination as used by the Ohio Experiment Station, the following are suggested by the Iowa Experiment Station:

(1) Equal parts by weight of air-slaked lime, salt, and bonemeal

or

(2)	Salt	30.0 pounds
	Finely ground bonemeal or bone flour	25.0 pounds
	Kainit, potassium chloride, or wood ashes	12.0 pounds
	Sulfur, Flowers of	10.0 pounds
	Glaubers Salts	5.7 pounds
	Epsom salts	5.0 pounds
	Copperas	2.0 pounds
	Potassium iodide	0.3 pound

According to results of experiments at the Iowa Station, the first mixture suggested has given as good results as the more complete one, but it is not safe to assume that such will be the case under all conditions. For Ohio, it is hardly necessary to include the potassium iodide, as it is only added as a possible preventive of hairless pigs, and that trouble is not prevalent enough in Ohio to justify the addition of potassium iodide.

It is probably preferable to self-feed the minerals, but usually more will be eaten when hand-fed. If hand-fed, about a pound per month per hog is the suggested amount.

RATIONS FOR THE BROOD SOW

In feeding the brood sow, it should be borne in mind that there are some factors to be considered that do not arise in feeding hogs for market. Not only must the sow be properly nourished to keep her in good condition, but provision must be made for the unborn pigs by providing feeds of muscle and bone-building character. Such feeds as shorts, middlings, oilmeal, tankage, ground oats, alfalfa meal, and skimmilk fed in connection with corn will usually give good results. Barley may be substituted for all or part of the corn, particularly if there is a tendency on the part of the sow to become too fat. It is impossible to say definitely what feeds are best and in what proportions they should be used, as the feeder must be guided by the condition of his sows. Young sows will require relatively more protein than older sows.

FEEDING THE BOAR

It is preferable to keep the boar in a good sized lot or yard, rather than keep him closely confined in a pen, as exercise is essential if the boar is to be kept in good breeding condition. Pasture should be provided in summer and plenty of rather bulky feeds such as alfalfa hay or meal, and mangels should be provided in winter. Corn may be fed but not in large quantities, and the bulk of the feed should consist of such feeds as ground oats, ground barley, shorts, oilmeal, and milk. As with the brood sow, it is not possible to give exact amounts, as the needs of each boar must be studied and given consideration.

It has not been the purpose of this bulletin to enter deeply into the science of swine feeding, but merely to offer some practical suggestions which, if followed, should lead to more economical pork production.

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